**Area of study: 1.1 The six characteristics (6Vs)**

**Lessons**

| **Lesson number** | **Specification coverage** | **GLH** | **Lesson aims and outcomes** | **Lesson ideas, key words and activities** | **Useful resources** | **Student independent learning – ideas and useful resources** |
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| 1 | 1.1The six characteristics (6Vs)* Volume of data
* Variety of data types
* Velocity of streamed data
* Value of data
* Veracity of data
* Variability of data inconsistencies
 | 3 | By the end of the lesson, students should:* know what each characteristic is
* understand how each characteristic helps to define big data
* understand the purpose of each characteristic
* understand when each characteristic can be used
 | Starter: Ask students for a definition of **big data.** The link to geeksforgeeks.org offers a good summary of traditional vs big data. Using individual computers, or teacher PC projected to screen, watch video on the origins of **big data** which uses the example of CERN, the international scientific research organisationon Ted-Ed lessons website. Give students a short set of pre-prepared questions on **6Vs,** using Motivaction website. Students access this site on 6Vs to answer the questions. (1 hour)Students could create an infographic on **6Vs** and their **importance** using software of their choice and availability (1 hour). See link to adobe site.Ask a question on 6Vs to check understanding e.g. ‘What is meant by the value of data characteristic of big data?’ or ‘What is meant by the variety of data types characteristic of big data?’. Discuss with a partner.Give students a wordsearch activity which contains the **6Vs** and clues written which define each characteristic, but with an alternative word. Use the weblinks to prepare.Plenary at the end of the lesson to summarise the learning, give verbal feedback from exam style question and set homework task on steps. (1 hour)**Additional approaches if you have time:**Introduce the term ‘big data’ and use the Exploding Topics site; this website introduces the types of big data we use daily. Students discuss types of data. Introduce the concept of the Vs as a way of categorising this data.Show students a brief teacher-prepared presentation on big data and the 6Vs which briefly explains what each characteristic means in the overall definition of big data. Use the link to the Motivaction site to prepare such a presentation.Teacher-led discussion on examples of different categories of big data, e.g. social media, online videos, sensors in machines, website clicks, scientific data and the purpose of each characteristic. Useful familiar examples would be Facebook, Netflix, TikTok.Students access a large dataset (csv files) from shared drive (you can download from the MavenAnalytics data playground). The site contains many examples. Students can experiment with sorting/filtering analysis techniques in a spreadsheet file. You can set questions which the students can answer from the file, while learning the difficulties of humans dealing with a huge dataset. This will start to prepare students to study steps to analyse big data in the next lesson. | [Difference between traditional and big data](https://www.geeksforgeeks.org/difference-between-traditional-data-and-big-data/) (geeksforgeeks.org)[Big data - Tim Smith](https://ed.ted.com/lessons/exploration-on-the-big-data-frontier-tim-smith) (ed.ted.com, 6 mins) – engaging cartoon, useful background on origins.[Big data: the 6 Vs you need to look at for important insights](https://www.motivaction.nl/en/actualities/news/big-data-the-6-vs-you-need-to-look-at-for-important-insights) (motivaction.nl) – offers good overview of the 6Vs. This will help you to prepare presentation slides on big data and 6Vs.[What is an infographic? Examples, templates and how to make fantastic designs](https://www.adobe.com/uk/express/learn/blog/what-is-an-infographic) (adobe.com) – detailed explanation.[Amount of Data Created Daily](https://explodingtopics.com/blog/data-generated-per-day) (explodingtopics.com) - an excellent overview of how much data is used daily- size and breakdown of data into different types.Useful sites for downloading data sets for students to examine:[Data playground](https://www.mavenanalytics.io/data-playground) (mavenanalytics.io) [UK data service open access](https://ukdataserviceopen.github.io/Teaching_datasets/Open) (ukdataserviceopen.github.io) | Useful article which summarises what big data is, examples and benefits: [What is big data](https://cloud.google.com/learn/what-is-big-data?hl=en) (cloud.google.com)Useful resources to assist student understanding of the size of big data. Units of measurement for storage data: [Units of measurement for storage data - IBM Documentation](https://www.ibm.com/docs/en/storage-insights?topic=overview-units-measurement-storage-data) (ibm.com)**Homework** Flipped learning on steps toanalyse big data to prepare for next lesson.Using the link [Big data analytics: What is it, how it works, benefits and challenges](https://www.tableau.com/analytics/what-is-big-data-analytics) (tableau.com), make brief notes on the four stages outlined. Bring notes to the next lesson.  |

**Subject knowledge support for this area of study**

| **Subject knowledge enhancement** | **Details** |
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| **Underlying knowledge and understanding** | Students should already have some knowledge of the definitions of data, information and knowledge and understand the differences between the terms. They should also understand what analysis means in the context of data.  |
| **Common misconceptions** | The three terms mentioned above can cause some confusion to students. If students have studied F200, this should not be a problem, but the meanings will need to be reinforced.  |
| **Key concepts** | Students should understand the meaning of the terms **big data** and the **6Vs.** They should know each of the 6 **characteristics** of big data and understand how **each applies** to big data. They need to have an understanding of the **size** and the **complexity** and **range** of big data. |
| **Subject knowledge enhancement for teachers**  | **Read:*** *Big Data in Practice*, Marr. B (2016), CERN – Chapter 2
* [Big Data – what are you saying?](https://www.teachengineering.org/activities/view/und-1721-big-data-collection-manipulation-analysis) (teachengineering.org)
* [What is big data](https://computer.howstuffworks.com/internet/basics/what-is-big-data-.htm?s1sid=w0wzifbakob1h0fduiuhyqpe&srch_tag=evk4kagvcstxpmax7acahvti7rjji6pc) (computer.howstuffworks.com) – gives a good overview
* *A Guide to big data trends, Artificial Intelligence, Machine learning, Predictive Analytics, Internet of Things, Data Science, Data Analytics, Business Intelligence and Data Mining*, Hurley. R (2019) Ationa - good introduction to 6Vs
* [With big data comes big power](https://medium.com/ciss-al-big-data/with-big-data-comes-great-power-efa6acb1a8ba) (medium.com) – useful article on TikTok and big data
* [A free and growing library of resources created by CompTIA](https://www.futureoftech.org/) (futureoftech.org) – excellent library of free resources which includes videos and articles on big data, Internet of Things, AI - good basis for discussions
* OCR Endorsed Textbook and eTextbook
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